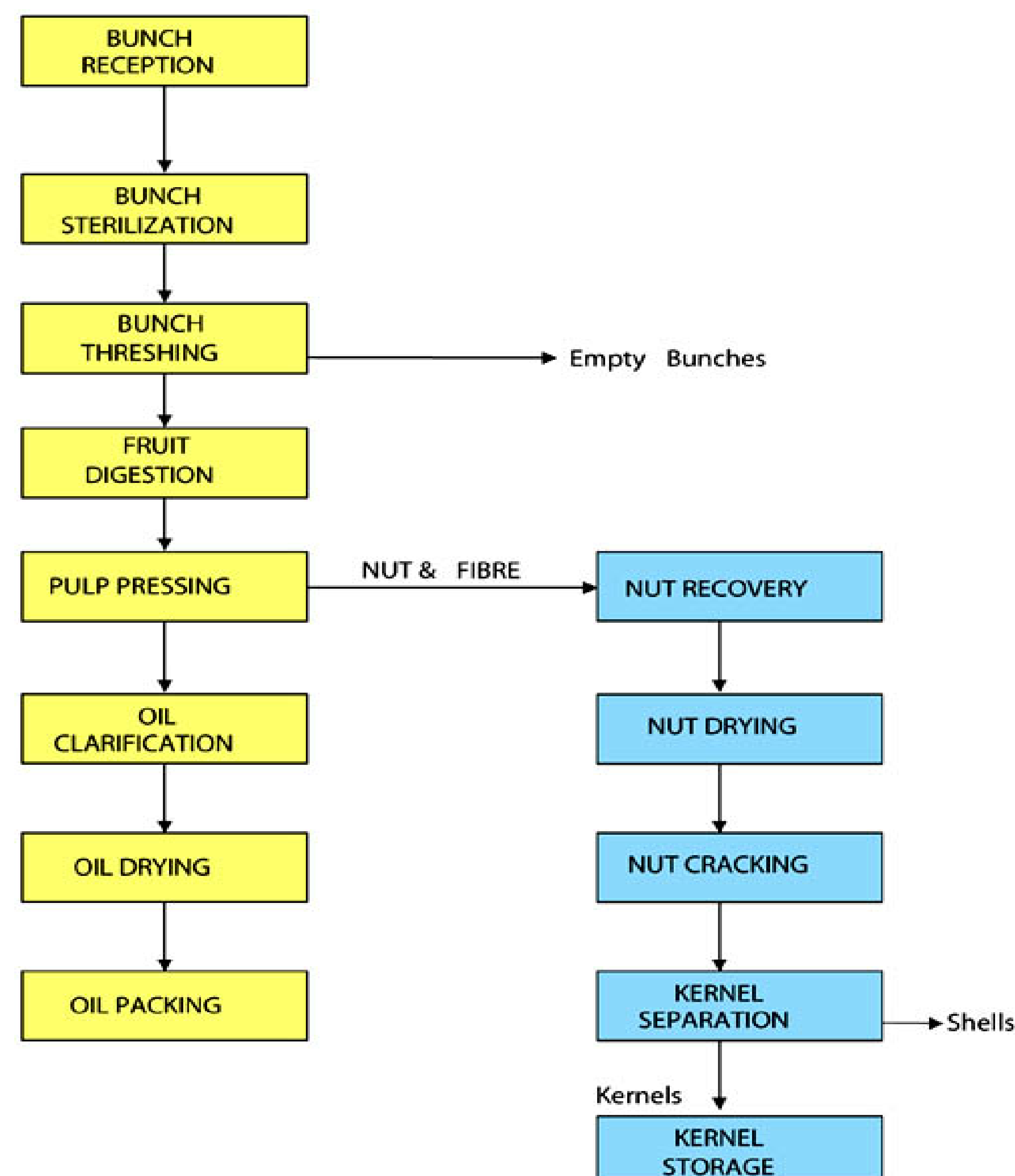


# Processing of Plantation Crop

## Oil Palm



The sequence of processes involve in the industrial/large scale extraction of oil palm to produce a high yield of internationally acceptable quality. These are:

### 1. The reception of fresh fruit bunches from the plantations

The quality standard achieved is initially dependent on the quality of bunches arriving at the mill. The mill cannot improve upon this quality but can prevent or minimize further deterioration. Adequate care should be taken during harvesting and transportation of the fruit to avoid excessive bruising; resulting in oil of reduced quality.

### 2. Threshing of bunches to free the palm fruit

This involved the removal of the fruits from the spikelets growing on a main stem. It can be achieved manually using cutlass or axe, the fruits are then hand-picked. In a mechanized system a rotating drum or fixed drum equipped with rotary beater bars detach the fruit from the bunch, leaving the spikelets on the stem.

### 3. Sterilization

Sterilization or cooking means the use of high-temperature wet-heat treatment of loose fruit. The cooking serves the following purposes:

- ◆ Heat treatment destroys oil-splitting enzymes and arrests hydrolysis and autoxidation.

- ◆ Heat allows the oil-bearing cells to come together and flow more easily on application of pressure.
- ◆ Fruit cooking weakens the pulp structure, softening it and making it easier to detach the fibrous material and its contents during the digestion process. Making the oil to be released more readily.
- ◆ The moisture introduced by the steam acts chemically to break down gums and resins which cause the oil to foam during frying.

#### **4. Digestion of the fruit**

Digestion is the process of releasing the palm oil in the fruit through breaking down of the oil-bearing cells. The digester is usually made up of cylindrical vessel fitted rotating shaft carrying a number of beaters. Through the action of the rotating beater arms the fruit is pounded.

#### **5. Pressing (Extracting the palm oil)**

There are two methods which can be employed in extracting oil from digested material. One system uses mechanical presses and is called the ‘dry’ method. The other called the ‘wet’ method uses hot water to leach out the oil.

In the ‘dry’ method, the oil is squeezed out of a mixture of oil, moisture, fibre and nuts by applying mechanical pressure on the digested mash.

#### **6. Clarification and drying of oil**

This process ensures the oil is separated from its impurities. The fluid coming out of the press is a mixture of palm oil, water, cell debris, fibrous material and ‘non-oily solids’. Hot water is added to the thick mixture in the ratio 3:1. The diluted mixture is passed through a screen to remove coarse fibre.

The screened mixture is boiled for one or two hours and then allowed to settle by gravity in the large tank so that the palm oil, being lighter than water, will separate and rise to the top. The clear oil is decanted into a reception tank. The decanted oil is re-heated in a cooking pot and the dried oil is carefully skimmed off from any residual moisture.

#### **7. Oil storage**

The purified oil is transferred to a tank for storage prior to dispatch from the mill. The stored temperature is maintained around 50°C using hot water or low-pressure steam-heating coils, to prevent solidification and fractionation. Iron contamination from the storage tank may occur if the tank is not lined with a suitable protective coating.



## **Cocoa**

The key processing steps in producing the most desirably flavoured cocoa beans are fermentation, drying and roasting. It's processing discussed below-

### **Pod splitting**

In most cocoa growing regions around the world, cocoa pods are typically split by hand using a machete. Once split, the the beans are collected and the pod shell discarded. Wet cocoa beans make up roughly 10% of the pod weight.

### **Fermenting**

Fermentation is the first critical process to develop the cocoa beans flavour. The beans, still covered with pulp are placed in large, shallow wooden boxes or are left in piles and covered with banana leaves. Fermentation generates temperatures as high as 55°C, activating enzymes that create the flavour precursors which are the beginning of chocolate as we know it. The fermentation process takes any where from 2-8 days. Unfermented or lightly fermented beans have less chocolate flavour but are higher in health-promoting antioxidants.

### **Drying**

Following fermentation, the still 'wet' beans are either sun dried or artificially dried in regions where constant rainfall occurs. Slow and controlled removal of moisture using sun drying seems to produce a more acceptable bean with lower acidity. Dried beans usually have final moisture levels between 5-7 %.

### **Roasting**

Roasting conditions vary considerably and are a key step in flavour development and removal of residual micro-organism. Whole cocoa beans can be roasted and then the nibs recovered through winnowing are ready for processing into cocoa liquor. Alternatively, nibs can be produced from unroasted beans and the nibs roasted before processing into cocoa liquor.

By varying temperature and time combinations, different flavours can be produced. However, it is essential that such processing conditions are enough to deliver the all important pathogen 'kill step' mentioned above.

### **Cracking and winnowing**

Once dried and roasted, cocoa beans are cracked into smaller pieces called nibs and the husks blown away and discarded. Cocoa nibs are then ready for refining or can be eaten as they are as a healthy and nutritious whole food.

# Bamboo

## Primary Processing

### 1. Logging

- We cut down bamboos aged 4 to 5 years.
- The best season for cutting is from early to late autumn when bamboo's internal water decreases.

### 2. Drying

- We dry bamboo naturally for 2 or 3 months.
- Bamboo is put upside-down to make water come out easily.

### 3. Removing Oil

- We heat the bamboo and remove water and oil.
- There are 2 methods for this process-

#### i) With hot water (humidifying method)

- Boil the bamboo in a hot water with caustic soda.
- **Advantage:** It softens bamboo. This method is used to make products such as bamboo baskets.

#### ii) With fire (drying method)

- Wipe the oil away from bamboo in roasting it with fire by charcoal or gas.
- **Advantage:** It makes bamboo's fiber harder and improves the durability.

### 4. Insolation

- Place the bamboo outside and insolate it.
- After 3 weeks, the green color will fade out and the bamboo will become shiny.

### 5. Storage

- Keep them in a depository to prevent mold from getting on bamboos.
- It depends on purposes, but these bamboos will be dried another 2 to 5 years.

## Secondary processing

After Primary processing, it uses in various purpose like as making cloth, furniture, toys, musical instrument etc. Then it need special processing followed by these various uses.

## **Betel Leaf**

1. Harvested leaves are washed, cleaned and graded according to their size and quality.
2. Then they are packed after cutting a portion of the petiole and rejecting the damaged leaves.
3. The picked leaves are sorted into different grades according to size, colour, texture and maturity.
4. After that, they are arranged in numbers for packing. For packing mostly bamboo baskets are used and in many places. Straw, fresh or dried banana leaves, wet cloth etc. are used for inner lining.
5. Usually betel leaves are used for chewing as fresh unprocessed. But in certain areas, leaves are subjected to processing known as bleaching or curing. Bleaching is done by successive heat treatments at 60°–70°C for 6–8 hours.

## **Betel nut**

### **1. Harvesting the fruits from the tree**

During the harvest season, the ripened fruits have to be harvested.

### **2. Separating the fruits from the bunches**

Once the fruit bunches are plucked from the tree, it has to be separated to get the individual fruits.

### **3. Peeling to get the Kernel**

One of the most important activities in the entire areca nut processing is this step. The raw fruit has to be peeled in order to get its kernel. This has to be done within a day or two after harvesting. Otherwise, the cutting will not be easy at all.

### **4. Boiling the kernel**

Immediately after the kernel is taken out, it has to be boiled with high temperature for minimum of 12 hours. Along with the water, the arecanut precipitate has to be mixed to get good color.

### **5. Sun drying the boiled kernel**

After boiling the areca nut kernel for about 12 hours, another crucial step is to sun dry the boiled kernel. This drying process has to be done for minimum of 7-10 days. This is the last step of areca nut processing.